Case Report

Infected iliac artery aneurysm with aortocaval fistula

Nozomu Sasahashi,[1] Mikihisa Hamazaki,[1] Hidenori Asada,[2] Tsuyoshi Kataoka,[2] Kunio Hamanaka[3] and Kei Nishiyama[1]

[1]Department of Emergency and Critical Care Medicine, [2]Department of Cardiovascular Surgery, and [3]Department of Radiology, National Hospital Organization, Kyoto Medical Center, Kyoto, Japan

Case: We report a case of an infected iliac artery aneurysm complicated by an aortocaval fistula.

Outcome: A 74-year-old-man was admitted with fever, chills, general fatigue, and appetite loss. The patient was diagnosed with an infected iliac artery aneurysm, which was controlled with antibiotics preoperatively. During hospitalization, deep vein thrombosis developed with a pulmonary embolism resulting from an aortocaval fistula. The patient was successfully operated on with *in situ* autologous vein graft reconstruction.

Conclusion: An infected iliac artery aneurysm with aortocaval shunt has rarely been reported. We successfully treated the patient with a combination of appropriate i.v. antibiotics and surgical resection.

Key words: Arteriovenous fistula, deep vein thrombosis, femoral vein, iliac artery, infected aneurysm

INTRODUCTION

INFECTED AORTIC OR iliac artery aneurysms are rare but life-threatening conditions.[1] Previously published reports indicate long-term antibiotic treatment and aneurysm resection.[2] In revascularization, it remains controversial whether *in situ* or extra-anatomical reconstruction should be indicated.[3]

Aortocaval shunt associated with an infected aortic aneurysm has rarely been reported.[4] We describe a case of an infected aortocaval shunt associated with iliac artery aneurysm treated with antibiotics and surgical repair.

CASE

A 74-YEAR-OLD MAN WITH a past history of hypertension and hypercholesterolemia was referred to our institute because of high fever, chills, general fatigue, and appetite loss that had persisted for 9 days. He had been prescribed levofloxacin at 500 mg/day in another clinic 3 days before visiting our institute.

Corresponding: Nozomu Sasahashi, Department of Emergency and Critical Care Medicine, National Hospital Organization, Kyoto Medical Center, 1-1, Fukakusa Mukaihata-cho, Fushimi-ku, Kyoto 612-8555, Japan. E-mail: nsasahas@kyotolan.hosp.go.jp
Received 16 Dec, 2015; accepted 3 Mar, 2016; online publication 3 May, 2016

On arrival, his blood pressure was 108/64 mmHg, heart rate 87 b.p.m., and body temperature 38.1°C. His abdomen was flat and no mass was palpable. Mild tenderness was noted in the right lower quadriceps, while Blumberg's sign was not evident.

Investigations revealed the following: white blood cell count, 16,600/mm^3; platelet count, 33.9 $\times$ 10^4/mm^3; and C-reactive protein, 20.3 mg/dL.

Abdominal computed tomography (CT) with contrast enhancement showed irregular dilatation with a saccular shape of the right common iliac artery, being 29 mm in maximum diameter. The arterial wall of the aneurysm showed intimal calcification and was partially thin. The CT value of the surrounding fat tissue was mildly elevated, suggesting an active inflammatory reaction. The adjacent inferior vena cava was compressed by the dilated artery (Fig. 1).

Although microorganisms were not detectable in blood cultures, the patient was strongly suspected to have an infected iliac artery aneurysm based on the clinical evidence of infection including fever, abdominal symptoms, laboratory data, and radiological findings.

The i.v. administration of antibiotics including ceftriaxone (1 g every 12 h) and vancomycin (1.25 g every 12 h) was immediately initiated. From the 5th hospital day, only ceftriaxone was continued.

On the 10th hospital day, the patient developed right lower leg swelling. Follow-up CT revealed thrombus formation in the inferior vena cava extending distally to the

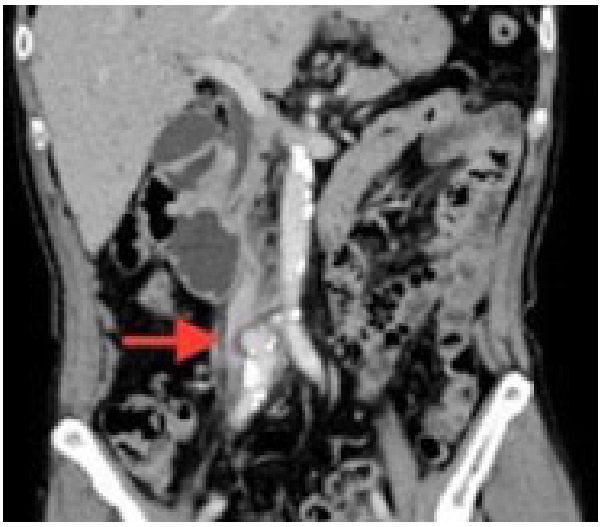

Fig. 1. Computed tomography of a 74-year-old-man shows irregular dilatation of the right common iliac artery with a saccular shape protruding into the inferior vena cava (arrow).

right common, internal iliac, and femoral veins. Multiple scattered pulmonary artery embolisms were also evident. The maximum diameter of the aneurysm was 32 mm and aortocaval shunt flow was suggested at the aneurysmal lesion (Fig. 2). While abdominal symptoms persisted, his general physical condition, associated with the respiratory and circulatory systems, was not impaired. Intravenous heparin sodium (10,000 units/day) was initiated. On the 13th hospital day, an inferior vena cava filter was placed through the left jugular vein to prevent further pulmonary embolism.

Surgical repair of the aneurysm was carried out on the 14th hospital day. Aneurysmal involvement was observed from the distal abdominal aorta to right common iliac artery (Fig. 3). Thrill was not noted around the aneurysm. Edematous and scar-related changes were observed around the portion, but purulent retention was not detectable.

When opening the aneurysm under vascular control, a punched-out defect of approximately 10 × 20 mm in diameter was found on the posterolateral aspect of the intima. An organized thrombus was present in the inferior vena cava and marked blood flow was observed through the defect. The defect was verified as an aortocaval fistula resulting from aneurysmal rupture into the inferior vena cava. The fistula was directly closed and the infected tissue including aneurysmal wall was radically excised. Arterial reconstruction was accomplished by end-to-end anastomosis using a reversed femoral vein graft harvested from the left lower leg. Lavage was performed using 10 L saline solution. A pedicled omental flap with a preserved blood supply was placed around the reconstructed site.

Postoperatively, the patient had been prescribed edoxaban tosilate hydrate at 30 mg/day as an anticoagulant for deep vein thrombosis and subsequently received antibiotics for 1 week until the white blood cell count and C-reactive protein improved to 9,100/mm^3 and 2.4 mg/dL, respectively. Nineteen days after the surgery, both values were within their normal limits.

Culturing revealed that the excised aneurysmal wall was sterile.

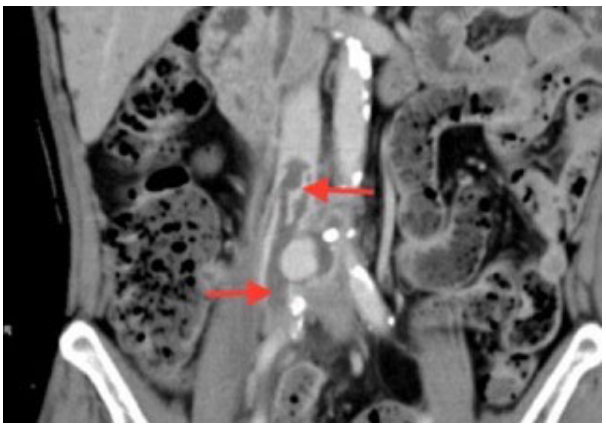

Fig. 2. Computed tomography of a 74-year-old-man diagnosed with an infected iliac artery aneurysm. The scan on the 10th hospital day revealed thrombus formation in the inferior vena cava (right arrow) and aortocaval shunt (left arrow) flow with enlargement of the aneurysm.

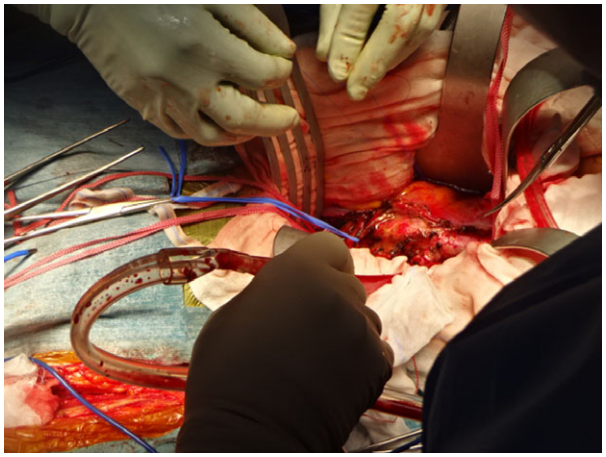

Fig. 3. An intraoperative photograph showing aneurysmal change from the distal abdominal aorta to right common iliac artery.

Histopathological examination of the excised specimen showed edematous change and red blood cell infiltration with fibrosis, being compatible with an infected arterial aneurysm.

Contrast-enhanced CT on the 33rd hospital day demonstrated adequate arterial blood flow and a decreased size of the intravenous thrombus.

He was discharged on the 35th hospital day without any complications and has maintained a favorable course without evidence of recurrent infection.

Three months after the operation, deep vein thrombosis was not detected on the follow-up CT. Anticoagulant therapy was continued for the prevention of recurrence of deep vein thrombosis.

DISCUSSION

AN AORTOCAVAL SHUNT associated with an infected artery aneurysm is a life-threatening condition because of rapidly progressive congestive heart failure resulting from left-to-right shunt; however, it has rarely been reported.[5,6] In this report, we describe a case of an aortocaval shunt associated with an infected iliac artery aneurysm treated with antibiotics and surgical repair.

Of all abdominal aortic and/or iliac artery aneurysms, the incidence of infected aneurysms has been reported to be approximately 2%.[1,4] Infected abdominal aneurysms are present mainly in the infrarenal abdominal aorta followed by the iliac artery, juxtarenal aorta, and suprarenal or thoracoabdominal aorta[3,6,7] and complicated by the involvement of adjacent structures including the psoas muscles, vertebral bodies, inferior vena cava, and gastrointestinal tract.[2] In-hospital mortality varies between 11% and 22.7%[3–5]

The diagnoses of infected abdominal aortic or iliac artery aneurysms are based on symptoms including fever, abdominal or back pain, and infectious signs such as leukocytosis, elevated C-reactive protein, and positive blood cultures.[1–3] Computed tomography or magnetic resonance angiography shows a saccular shape, rapid growth of the aneurysm, and perforation or penetration into surrounding structures as well as periaortic inflammation.[1,6] High positive rates of cultures from blood or surgical specimens have been reported.[3,5,7] *Staphylococcus aureus* and *Salmonella* species were predominantly reported as the most common causative organisms.[1–6,9] Brossier *et al.* also reported a wider bacteriological spectrum including *Campylobacter fetus*, *Listeria monocytogenes*, and *Mycobacterium tuberculosis*.[7] In the present case, although blood cultures were negative, probably due to the antibiotic treatment prior to admission,[3,5,6] the clinical evidence including persistent inflammatory laboratory data, fever, and abdominal symptoms as well as radiological findings led us to make an early diagnosis. Growth and morphological change of the aneurysm were clearly revealed on CT carried out on the 10th hospital day.

A combination of the appropriate i.v. antibiotics on the basis of the blood culture results and aneurysmal resection is the mainstay of treatment for an infected aortic aneurysm.[2] Broad-spectrum antibiotic therapy is recommended when blood culture results are not available, but the required duration of antibiotic therapy is not well established[1,6] In our case, empirical antimicrobial therapy of ceftriaxone and vancomycin was initially used. The patient was given antibiotic therapy for 1 week after the surgical repair. No recurrent signs of infection have been noted.

Surgical repair consists of the excision of a diseased artery and/or aorta and revascularization. Although it remains controversial whether *in situ* reconstruction or extra-anatomical bypass should be recommended, *in situ* reconstruction has gradually become the standard procedure for patients with infection control achieved by preoperative antibiotic therapy and/or extensive local debridement.[2,3,5,9] In the present case, *in situ* reconstruction was accomplished using an autologous femoral vein graft. Femoral or saphenous veins are widely used as grafts in iliac arterial infection. The major advantage of the vein graft is its marked resistance to infection, however, long-term observation may be important because of intimal hyperplasia that causes stenosis of the graft.[8] In this case, the left femoral vein was used as a graft because right lower leg swelling resulting from deep vein thrombosis was detected. End-to-end anastomoses were accomplished without any interventions on proximal or distal sides because of a negligible difference in diameter. Postoperatively, arterial flow to the right lower leg was sufficient and left lower swelling did not develop.

In cases with an aortocaval shunt associated with an infected aortic aneurysm, patients deteriorated rapidly because of acute congestive heart failure resulting from significant left-to-right shunt, and they required emergent surgery.[5,6] In the present case, aortocaval shunt was detected at the aneurysmal lesion on follow-up CT, but the shunt size seemed to be very small because of the finding of its linear flow. This was probably because the massive shunt flow was prevented by the thrombus in the inferior vena cava. As a result, cardiac symptoms were not apparent and the hemodynamics remained quite stable. So, an emergency operation was not considered.

The cause of deep vein thrombosis might be related to compression by the aneurysm. Additionally, the local inflammatory status may be involved in the thrombosis. Aortocaval shunt might not be directly related to the occurrence of deep vein thrombosis, because the size of the shunt was not large.

CONFLICT OF INTEREST

NONE.

REFERENCES

1 Maeda H, Umezawa H, Goshima M *et al.* Primary infected abdominal aortic aneurysm: surgical procedures, early mortality rates, and a survey of the prevalence of infectious organisms over a 30-year period. Surg. Today 2011; 41: 346–51.
2 Lai CH, Luo CY, Lin PY *et al.* Surgical consideration of *in situ* prosthetic replacement for primary infected abdominal aortic aneurysms. Eur. J. Vasc. Endovasc. Surg. 2011; 42: 617–24.
3 Dubois M, Daenens K, Houthoofd S, Peetermans WE, Fourneau I. Treatment of mycotic aneurysms with involvement of the abdominal aorta: single-centre experience in 44 consecutive cases. Eur. J. Vasc. Endovasc. Surg. 2010; 40: 450–6.
4 Kagaya H, Miyata T. Infected abdominal aortic and iliac artery aneurysm: a single center 25-year experience. J. Vasc. Surg. 2010; 51: 32S.
5 Oderich GS, Panneton JM, Bower TC *et al.* Infected aortic aneurysm: aggressive presentation, complicated early outcome, but durable results. J. Vasc. Surg. 2001; 34: 900–8.
6 Muller BT, Wegener OR, Grabitz K, Pillny M, Thomas L, Sandmann W. Mycotic aneurysms of the thoracic and abdominal aorta and iliac arteries: experience with anatomic and extra-anatomic repair in 33 cases. J. Vasc. Surg. 2001; 33: 106–13.
7 Brossier J, Lesprit P, Marzelle J, Allaire E, Becquemin JP, Desgranges P. New bacteriological patterns in primary infected aorto-iliac aneurysms: a single-centre experience. Eur. J. Vasc. Endovasc. Surg. 2010; 40: 582–8.
8 Daenens K, Fourneau I, Nevelsteen A. Ten-year experience in autogenous reconstruction with the femoral vein in the treatment of aortofemoral prosthetic infection. Eur. J. Vasc. Endovasc. Surg. 2003; 25: 240–5.
9 Lee CH, Hsieh HC, Ko PJ, Li HJ, Kao TC, Yu SY. In situ versus extra-anatomical reconstruction for primary infected infrarenal abdominal aortic aneurysms. J. Vasc. Surg. 2011; 54: 64–70.